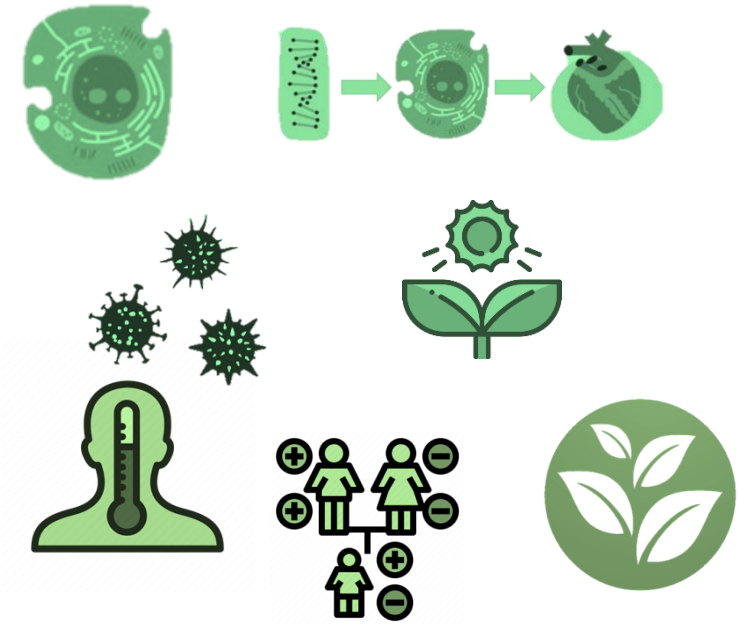
BIOLOGY

KEY TERMS



CARDINAL NEWMAN CATHOLIC SCHOOL

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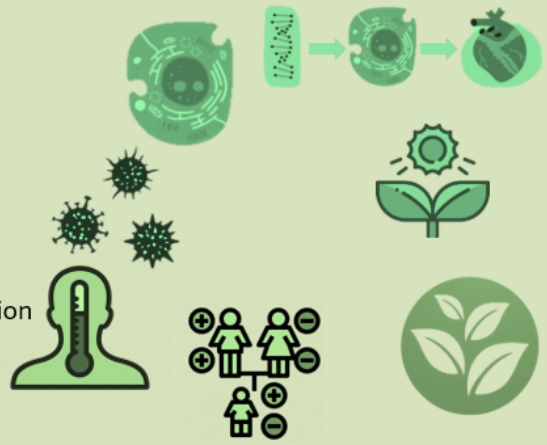
COMBINED SCIENCE

Biology

Paper 1 (1 hour 15 minutes)
Tuesday 13th May 2025 (PM)
B1: Cell Biology
B2: Organisation
B3: Infection and response
B4: Bioenergetics

Paper 2 (1 hour 15 minutes)
Monday 9th June 2025 (AM)
B5:Homeostasis
B6: Inheritance, variation and evolution
B7: Ecology



SEPARATE SCIENCE

Biology

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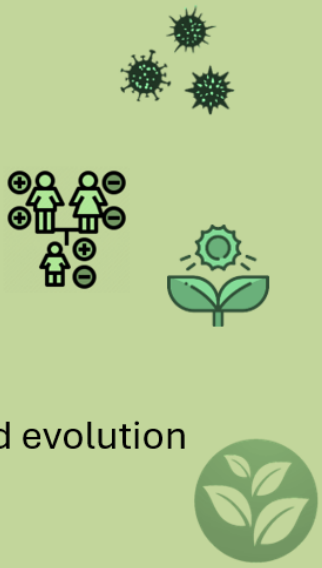

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BIOLOGY PAPER 1

TOPIC 1: CELL BIOLOGY 

Active transport: The movement of substances from a more dilute solution to a more concentrated solution (against a concentration gradient) with the use of energy from respiration.

Adult stem cell: A type of stem cell that can form many types of cells.

Agar jelly: A substance placed in petri dishes which is used to culture microorganisms on.

Cell differentiation: The process where a cell becomes specialised to its function.

Cell membrane: A partially permeable barrier that surrounds the cell.

Cell wall: An outer layer made of cellulose that strengthens plant cells.

Chloroplast: An organelle which is the site of photosynthesis.

Chromosomes: DNA structures that are found in the nucleus which are made up of genes.

Concentration gradient: The difference in concentration between two areas.

Diffusion: The spreading out of the particles of any substance in solution, or particles of a gas, resulting in a net movement from an area of higher concentration to an area of lower concentration

Embryonic stem cell: A type of stem cell that can differentiate into most types of human cells.

Eukaryotic cell: A type of cell found in plants and animals that contains a nucleus.

Magnification: How much bigger an image appears compared to the original object.

Meristematic cells: A type of stem cell that can differentiate into any type of plant cell.

Mitochondria: An organelle which is the site of respiration.

Mitosis: A type of cell division which produces two genetically identical daughter cells from one parent cell.

Nucleus: An organelle found in most eukaryotic cells that contains the genetic material of the

cell and controls the activities of the cell.

Organelle: A specialised structure found inside a cell.

Osmosis: The diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.

Plasmid: Loops of DNA found in the cytoplasm of prokaryotic cells.

Prokaryotic cell: A type of cell found in bacteria that does not contain a nucleus.

Resolution: The ability to distinguish two different points in a specimen.

Specialised cells: Cells that are adapted to perform a specific function.

Stem cell: An undifferentiated cell that can divide to produce many specialised cells of the same type.

Surface area: The amount of contact an object has with its environment.

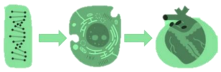
Surface area to volume ratio (SA:V): The size of the object compared with the amount of area where it contacts its environment.

The cell cycle: A series of stages preparing the cell for division.

Therapeutic cloning: Producing an embryo that has the same genes as a patient.

Vacuole: An organelle that stores cell sap.

TOPIC 2: CELL ORGANISATION



Amylase: An enzyme produced in the salivary glands and pancreas that breaks carbohydrates down into simple sugars.

Aorta: The main artery that takes oxygenated blood away from the heart to the body.

Artery: A blood vessel that carries blood at high pressure away from the heart.

Benign tumour: An abnormal cell growth that is contained within one area and does not invade other areas of the body.

Bile: A substance made in the liver and stored in the gallbladder which is used to neutralise stomach acid in the intestine and emulsify fats.

Blood: A tissue containing red blood cells, white blood cells, platelets and plasma.

Cancer: A non-communicable disease caused by changes in the cell that lead to uncontrolled growth and division.

Capillary: A very thin blood vessel that is used for exchange of substances.

Cell: The basic building block of all living organisms.

Communicable disease: A disease that can be spread between individuals either directly or indirectly.

Coronary heart disease: A disease caused by the buildup of fatty deposits inside the coronary artery, narrowing it and reducing blood flow to the heart tissue.

Enzymes: Biological catalysts that increase the rate of reactions in living organisms.

Health: The state of physical and mental wellbeing.

Heart: An organ that pumps blood around the body in a double circulatory system.

Lipase: An enzyme that is produced in the pancreas that breaks lipids down into fatty acids and glycerol.

Lock and key hypothesis: A theory that describes how substrates must be the correct shape to fit the active site of an enzyme.

Malignant tumour: A cancerous cell growth that invades neighbouring tissues and can spread to different parts of the body in the blood.

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Meristem tissue: Plant tissues containing undifferentiated stem cells.

Metabolism: All of the chemical reactions occurring in an organism.

Non-communicable disease: A disease which cannot be spread between individuals.

Organs: Aggregations of tissues performing specific functions.

Organ systems: Groups of organs that work together to form organisms

Palisade mesophyll: A tissue found in plant leaves that is specialised to carry out photosynthesis.

Phloem: A transport tissue found in plants which is specialised to transport sugars from source to sink.

Protease: An enzyme produced in the stomach and pancreas that breaks proteins down into amino acids.

Pulmonary artery: The main artery that takes deoxygenated blood away from the heart to the lungs.

Pulmonary vein: The main vein that takes oxygenated blood back to the heart from the lungs.

Rate of reaction: The speed at which reactants are converted into products.

Risk factor: Something that increases a person's risk of developing a disease.

Spongy mesophyll: A tissue found in plant leaves that is specialised for gas exchange.

Statins: A class of drugs that are used to reduce blood cholesterol levels which slows down the rate of fatty material deposit.

Stent: A tube that can be surgically implanted into blood vessels to keep them open.

Tissue: A group of cells with a similar structure and function.

Translocation: The movement of food molecules through the phloem tissue.

Transpiration: The process of water evaporating from a plant.

Vein: A blood vessel that carries blood at a low pressure back to the heart.

Vena cava: The main vein that takes deoxygenated blood back to the heart from the body.

Xylem: A transport tissue in plants which is specialised to transport water and dissolved minerals from the roots of the plant to the leaves.

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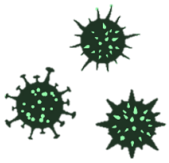
TOPIC 3: INFECTION AND RESPONSE



Antibiotics: Medicines that help to cure bacterial disease by killing infective bacteria inside the body.

Clinical drug testing: Drug testing done on healthy human volunteers and patients.

Communicable disease: A disease that can be spread between individuals either directly or indirectly.

Double blind trial: A study performed where neither the researcher or patient know whether the patient is taking the drug or a placebo.

Gonorrhoea: A sexually transmitted disease (STD) caused by a bacterium with symptoms of a thick yellow or green discharge from the vagina or penis and pain on urinating.

Human Immunodeficiency Virus (HIV): An infectious virus that weakens the immune system and can lead to AIDS (acquired immunodeficiency syndrome).

Malaria: A disease caused by a protist that causes recurrent episodes of fever and can be fatal.

Measles: A serious disease caused by a virus that shows symptoms of fever and a red skin rash.

***Monoclonal antibodies: Antibodies produced from a single clone of cells that are specific to one binding site on one protein antigen.**

Non-communicable disease: A disease which cannot be spread between individuals.

Non-specific defence: General physical and chemical barriers that defend the body against lots of different types of pathogen.

Pathogens: Microorganisms that cause infectious disease.

Placebo: A substance designed to be indistinguishable from a drug being tested but has no actual effect on the patient.

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Preclinical drug testing: Drug testing done in a laboratory using cells, tissues and live animals.

Rose black spot: A fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early.

Salmonella: A bacterial disease that is spread by bacteria ingested in food and can cause a fever, abdominal cramps, vomiting and diarrhoea.

Side effects: Other additional effects that the drug has that are different from the expected effect of the drug.

Tobacco Mosaic Virus (TMV): A widespread plant pathogen affecting many species of plants which produces a mosaic pattern on the leaves and limits the plant growth.

Vaccination: The process of introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies

White blood cell: An important type of cell that makes up the immune system and produces antibodies and antitoxins.

TOPIC 4: BIOENERGETICS

Aerobic respiration: A form of respiration that uses oxygen to release energy from molecules like glucose - represented by the following word equation:

Glucose + Oxygen > Carbon Dioxide & Water

Anaerobic respiration: A form of respiration that releases energy from molecules like glucose without using oxygen - represented by the following word equation:

Glucose > Lactic Acid

Cellular respiration: An exothermic reaction which is continuously occurring in living cells.

Inverse proportion: A relationship between two values where as one value increases, the other value decreases at the same rate.

Inverse square law: As the distance from a light source increases, the light intensity is inversely proportional to the distance squared - given by the following equation:

$$Light\ intensity \propto \frac{1}{(Distance\ from\ the\ light\ source)^2}$$

Limiting factor: A factor that limits the rate of a reaction when there is not enough of it.

Metabolism: The sum of all the reactions in a cell or the body.

Oxygen debt: The amount of extra oxygen the body needs after exercise to react with the accumulated lactic acid and remove it from the cells.

Photosynthesis: An endothermic reaction in which energy is transferred from the environment to the chloroplasts by light.

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PAPER 2

TOPIC 5: HOMEOSTASIS

Abstinence: Deliberately refraining from having sexual intercourse.

***Accommodation:** The process of changing the shape of the lens to focus on near or distant objects.

Adrenaline: A hormone that is produced by the adrenal glands in response to fear or stress which increases the heart rate and boosts the delivery of blood to the brain and muscles as a part of the 'fight or flight' response.

***Antidiuretic hormone (ADH): A hormone that increases the reabsorption of water in the kidney tubules.**

Contraception: Methods used to prevent pregnancy.

Coordination centres: Areas of the body like the brain, spinal cord and pancreas that receive and process information from receptors.

***Deamination: A process occurring in the liver that removes the amino group from an amino acid to produce ammonia.**

***Dialysis:** A method of treating kidney failure or disease where the blood is artificially filtered to remove waste and toxins.

Effectors: Muscles or glands which bring about responses which restore optimum levels.

***Ethene: A type of plant hormone which controls cell division and the ripening of fruits.**

Follicle stimulating hormone (FSH): A female reproductive hormone that causes the maturation of an egg in the ovary.

***Geotropism/Gravitropism:** A plant's directional growth response to gravity.

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***Gibberellins: A type of plant hormone which initiates seed germination.**

Gland: A group of cells that secrete chemicals called hormones directly into the bloodstream.

Glucagon: A hormone produced by the pancreas that causes glycogen to be converted into glucose and released into the blood.

Homeostasis: The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes.✢

***Hyperopia:** A defect of the eye where nearby objects appear out of focus (also called long sightedness).

In Vitro Fertilisation (IVF): Fertilising a woman's egg using sperm outside of the body.

Luteinising hormone (LH): A female reproductive hormone that stimulates the release of an egg.

***Myopia:** A defect of the eye where distant objects appear out of focus (also called short sightedness).

Negative feedback cycle: A regulatory mechanism that reverses a change.

Oestrogen: The main female reproductive hormone which causes the uterus lining to grow and repair.

***Phototropism**: A plant's directional growth response to light.

Receptors: Organs or cells that detect stimuli.

Reflex action: A rapid and automatic response to a stimulus.

Selective reabsorption: Reabsorbing certain useful molecules (like glucose, some ions and water) back into the blood after they have been filtered out.

Stimuli: Changes in the environment.

Target organ: The organ which a hormone acts on to produce an effect.

Testosterone: The main male reproductive hormone produced by the testes and it stimulates sperm production.

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***The brain**: An organ made of billions of interconnected neurones which controls complex behaviour and has different regions that carry out different functions.

The central nervous system (CNS): The brain and spinal cord which coordinate the response of effectors.

***The eye:** A sense organ containing receptors sensitive to light intensity and colour.

***Thermoregulatory centre:** An area of the hypothalamus in the brain which contains blood temperature receptors and regulates body temperature.

Thyroxine: **A hormone produced by the thyroid gland that increases the metabolic rate in the body.**

Type 1 diabetes: A disorder in which the pancreas fails to produce sufficient insulin which is characterised by uncontrolled high blood glucose levels.

Type 2 diabetes: A disorder where the body cells no longer respond to insulin produced by the pancreas.

***Vasoconstriction**: The constriction of blood vessels.

***Vasodilation:** The dilation of blood vessels.

TOPIC 6: INHERITANCE, VARIATION AND EVOLUTION

***Adult cell cloning:** A type of cloning that forms an embryo from an adult body cell.

Allele: A version of a gene.

Amino acids: Small molecules from which proteins are assembled.

Archaea: Primitive bacteria existing in extreme environments.

Asexual reproduction: A form of reproduction involving a single parent. Creates genetically identical offspring.

Binomial system: The universal system of naming organisms using their genus and species.

Charles Darwin: The scientist who developed the theory of evolution by natural selection.

Chromosome: A long, coiled molecule of DNA that carries genetic information in the form of genes.

Classification: The organisation of organisms into groups based on their characteristics and structure.

***Coding DNA: A sequence of DNA that codes for the production of a protein.**

***Complementary: Describes how the chemical bases in DNA pair up with each other. A pairs with T and C pairs with G.**

***Cuttings**: The simplest method of cloning plants. A branch is cut from a parent plant and replanted in compost after removing the lower leaves.

Cystic fibrosis: A cellular membrane disorder resulting from the presence of a recessive allele.

DNA: A double-stranded polymer wound to form a double helix. Carries the genetic code.

Dominant: Describes an allele that is always expressed. Represented by a capital letter.

Embryo screening: A procedure used to determine the presence of faulty genes in an embryo produced by IVF. A few embryonic cells are removed and screened for defective alleles.

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***Embryo transplants:** The simplest method of animal cloning. Cells are removed from a developing embryo, split apart and grown in culture, before being transplanted into host mothers.

Evolution: The gradual change in the inherited traits within a population over time. Occurs due to natural selection.

Evolutionary tree: A diagram which illustrates the evolutionary relationships between organisms.

Extinction: The death of all members of a species.

Family tree: A chart used to show the inheritance of a condition in a family.

Fertilisation: The fusion of the nucleus of male and female gametes. Restores the full chromosome number.

Fossil: The remains of dead organisms found in rocks which are millions of years old.

Gametes: Sex cells (sperm and egg cells) with half the usual number of chromosomes.

Gene: A section of DNA that codes for a specific sequence of amino acids which undergo polymerisation to form a protein.

Genetic engineering: The modification of the genome of an organism by the insertion of a desired gene from another organism, enabling the formation of organisms with beneficial characteristics.

Genome: The complete genetic material of an organism.

Genotype: An organism's genetic composition. Describes all alleles.

GM crops: Crops that have had their genomes modified by the insertion of a desired gene from another organism.

Heterozygous: When someone has two different alleles of a gene e.g. Ff.

Homozygous: When someone has two identical alleles of a gene e.g. ff.

Inbreeding: The formation of offspring from the breeding of closely related individuals.

Linnaean system: The classification of organisms into kingdom, phylum, class, order, family, genus and species, as developed by Carl Linnaeus.

Meiosis: A form of cell division that produces gametes, non-identical cells with half the usual number of chromosomes.

Mitosis: A form of cell division that produces two genetically identical daughter cells (with a full set of chromosomes) from one parent cell.

MRSA: A type of bacteria that is resistant to the antibiotic, methicillin.

Mutation: A random change in DNA which may result in genetic variants.

Natural selection: The process by which the frequency of advantageous traits passed on in genes gradually increases in a population over time.

***Non-coding DNA: DNA which does not code for a protein but instead controls gene expression.**

***Nucleotide:** The monomers of DNA consisting of a common sugar, a phosphate group and one of four chemical bases (A, T, C, G) attached to the sugar.

Phenotype: An organism's observable characteristics. Due to interactions of the genotype and the environment.

Polydactyly: A condition where an individual is born with extra fingers or toes due to the presence of a dominant allele.

***Protein synthesis: The formation of a protein from a gene.**

Punnett square: A grid used to predict the potential outcomes of a genetic cross.

Recessive: Describes an allele that is only expressed in the absence of a dominant allele. Represented by a small letter.

Ribosomes: Sub-cellular structures where protein synthesis takes place.

Selective breeding: The process by which humans artificially select organisms with desirable characteristics and breed them to produce offspring with desirable phenotypes.

Sex chromosomes: A pair of chromosomes responsible for the determination of gender. XY in males. XX in females.

Sexual reproduction: A form of reproduction involving the fusion of male and female gametes. Creates genetic variation.

***Speciation**: The formation of new species in the course of evolution, often due to the evolution of two isolated populations.

Species: A group of similar organisms that are able to breed with one another to produce fertile offspring.

Three-domain system: A method of classification in which organisms are categorised into three groups; Archaea, Bacteria and Eukaryota. Developed by Carl Woese.

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***Tissue culture**: A method of growing living tissue or cells in a suitable medium to produce clone plants.

Variation: The differences between individuals due to genes, the environment or a combination of both.

Vector: A carrier used to transfer a gene from one organism to another.

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TOPIC 7: ECOLOGY

Abiotic factors: The non-living aspects of an ecosystem e.g. temperature, light intensity, moisture, wind direction, wind intensity, soil pH, soil mineral content, carbon dioxide levels and oxygen levels.

Adaptation: A feature of an organism that increases its chance of survival in its environment. Such features may be behavioural, structural or functional.

***Anaerobic decay**: Decomposition in the absence of oxygen (commonly occurring in waterlogged soils) that produces carbon dioxide and methane gas.

***Apex predator:** A carnivore at the top of the food chain with no predators.

Biodiversity: The variety of living organisms in an ecosystem.

***Biogas**: A type of biofuel (methane gas) produced by anaerobic decay in biogas generators.

Biotic factors: The living components of an ecosystem e.g. food availability, pathogens, predators and other species.

Carbon cycle: The cycle through which carbon (in the form of carbon dioxide) moves between living organisms and the environment, involving respiration, photosynthesis and combustion.

Community: All of the populations of different species living together in a habitat.

Competition: When different organisms compete for the same resources (e.g. light, water, mates, territory) in an ecosystem. This limits population sizes and stimulates evolutionary change.

***Compost:** Dead and decaying organic matter, commonly used as a fertiliser.

***Decomposers:** Organisms that release enzymes which catalyse the breakdown of dead plant and animal material into simpler organic matter.

***Decomposition:** The breakdown of dead materials into simpler organic matter. The rate of decomposition is affected by temperature, water and oxygen availability.

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***Deforestation:** The removal of trees from land which is subsequently used to grow crops or provide space for cattle.

***Distribution: The spread of living organisms in an ecosystem. It is affected by environmental changes which may be seasonal, geographic or man-made.**

Ecosystem: The community of organisms (biotic) and non-living (abiotic) components of an area and their interactions.

Efficiency of biomass transfer: The efficiency of biomass transfer between trophic levels is calculated using:

$$\text{efficiency} = \frac{\text{biomass available after transfer}}{\text{biomass available before transfer}} \times 100$$

Extremophiles: Organisms that can live in extreme environments e.g. high temperatures, high salinity.

Food chain: Describes the feeding relationships between organisms and the resultant stages of biomass transfer. It takes the form:

producer ⟶ primary consumer ⟶ secondary consumer ⟶ tertiary consumer

***Food security:** Ensuring that populations have access to adequate amounts of safe and nutritious food.

Global warming: The gradual rise in the average temperature of the Earth due to increasing atmospheric levels of carbon dioxide and methane gas.

***GM crops:** Crops that have had their genomes modified by the insertion of a desired gene from another organism.

Interdependence: The dependence of different organisms on each other for survival e.g. plants depend on pollinators, herbivores depend on plants.

Mean: The average of a set of numbers calculated by dividing the sum of the values by the number of values.

Median: The middle number in a list of values ordered from lowest to highest.

Microorganisms: Very small organisms involved in the recycling of materials in an ecosystem. They return mineral ions to the soil and convert carbon to carbon dioxide which is released into the atmosphere.

Mode: The number that occurs most commonly in a set of data values.

***Mycoprotein**: A food high in protein (suitable for vegetarians) that is produced by the microorganism, Fusarium, in fermentation vats.

Peatlands: Areas of peat soil in wetland habitats formed by the accumulation of partially decayed organic matter. Peat is commonly used as a garden compost.

Pollution: Contamination or destruction of the natural environment due to human intervention.

Population: All organisms of the same species living with one another in a habitat.

Predators: Consumers that prey on and eat other animals.

Prey: Animals that are eaten by predators.

***Primary consumers**: Herbivores that consume producers at trophic level 2 of a food chain.

Producers: Photosynthetic organisms (e.g. green plant or alga) at the start of the food chain that provide biomass for all living things.

***Pyramid of biomass:** A table of the dry mass of living material at each trophic level of a food chain. This forms the shape of a pyramid.

Quadrat: A square grid of known area used in sampling to determine the abundance and distribution of organisms in an ecosystem.

***Secondary consumers:** Carnivores that consume herbivores at trophic level 3 of a food chain.

***Sustainable:** The ability to maintain something for future generations.

***Sustainable fisheries:** Methods of harvesting fish at a sustainable rate and increasing fish stocks, for example, by controlling net size or introducing fishing quotas.

***Tertiary consumers:** Carnivores that consume other carnivores at trophic levels 4 and above of a food chain.

Transect: A line along an area used in sampling to determine the abundance and distribution of organisms in an ecosystem.

***Trophic level:** The position of an organism in a food chain.

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Water cycle: The cycle through which water moves between living organisms and the environment, involving evaporation, transpiration, condensation and precipitation.

AQA GCSE Science Command Words

These command words tell you what to you need to do when you are doing exam questions.

Balance	Students need to balance a chemical equation.
Calculate	Students should use numbers given in the question to work out the answer.
Choose	Select from a range of alternatives.
Compare	This requires the student to describe the similarities and/or differences betweenthings, not just write about one.
Complete	Answers should be written in the space provided, for example, on a diagram, inspaces in a sentence or in a table.
Define	Specify the meaning of something.
Describe	Students may be asked to recall some facts, events or process in an accurateway.
Design	Set out how something will be done.
Determine	Use given data or information to obtain and answer.
Draw	To produce, or add to, a diagram.
Estimate	Assign an approximate value.
Evaluate	Students should use the information supplied, as well as their knowledge and understanding, to consider evidence for and against when making a judgement.
Explain	Students should make something clear, or state the reasons for somethinghappening.
Give	Only a short answer is required, not an explanation or a description.
Identify	Name or otherwise characterise.
Justify	Use evidence from the information supplied to support an answer.
Label	Provide appropriate names on a diagram.
Measure	Find an item of data for a given quantity.
Name	Only a short answer is required, not an explanation or a description. Often it canbe answered with a single word, phrase or sentence.
Plan	Write a method.
Plot	Mark on a graph using data given.
Predict	Give a plausible outcome.
Show	Provide structured evidence to reach a conclusion.
Sketch	Draw approximately.
Suggest	This term is used in questions where students need to apply their knowledgeand understanding to a new situation.
Use	The answer must be based on the information given in the question. Unless theinformation given in the question is used, no marks can be given. In some cases students might be asked to use their own knowledge and understanding.
Write	Only a short answer is required, not an explanation or a description.

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